

RECOMMENDATIONS

Based upon its observations regarding the impact of Hurricane Katrina on communications networks and the sufficiency and effectiveness of the recovery effort, the Panel has developed a number of recommendations to the FCC for improving disaster preparedness, network reliability and communications among first responders. These recommendations fall within four basic areas:

- ▶ ***Pre-positioning the communications industry and the government for disasters in order to achieve greater network reliability and resiliency.*** These recommendations include:
 - *Pre-positioning for the Communications Industry—A Readiness Checklist.* The FCC should work with and encourage each industry sector, through their organizations or associations, to develop and publicize sector-specific readiness recommendations.
 - *Pre-positioning for Public Safety – An Awareness Program for Non-Traditional Emergency Alternatives.* The FCC should take steps to educate the public safety community about the availability and capabilities of non-traditional technologies that might provide effective back-up solutions for existing public safety communications systems.
 - *Pre-positioning for FCC Regulatory Requirements – An A Priori Program for Disaster Areas.* The FCC should explore amending its rules to permit automatic grants of certain types of waivers or special temporary authority (STA) in a particular geographic area if the President declares that area to be a "disaster area".
 - *Pre-positioning for Government Outage Monitoring – A Single Repository and Contact with Consistent Data Collection.* The FCC should coordinate with other federal and state agencies to identify a single repository/point of contact for communications outage information in the wake of an emergency. The Panel suggests that the FCC is the federal agency best situated to perform this function.
- ▶ ***Improving recovery coordination to address existing shortcomings and to maximize the use of existing resources.*** These recommendations include:
 - *Remedying Existing Shortcomings – National Credentialing Guidelines for Communications Infrastructure Providers.* The FCC should work with other appropriate federal departments and agencies and the communications industry to promptly develop national credentialing requirements and process guidelines for enabling communications infrastructure providers and their contracted workers access to the affected area post-disaster.
 - *Remedying Existing Shortcomings – Emergency Responder Status for Communications Infrastructure Providers.* The Panel supports the National Security Telecommunications Advisory Committee's ("NSTAC's") recommendation that telecommunications infrastructure providers and their contracted workers be afforded emergency responder status under the Stafford Act, but recommends that it be broadened to include all communications infrastructure providers.

- *Remedying Existing Shortcomings – Utilization of State/Regional Coordination Bodies.* The FCC should work with state and local government and the communications industry (including wireline, wireless, WISP, satellite, cable and broadcasting) to better utilize the coordinating capabilities at regional, state and local Emergency Operations Centers, as well as the Joint Field Office.
 - *Maximizing Existing Resources – Expanding and Publicizing Emergency Communications Programs (GETS, WPS, and TSP).* The FCC should work with the National Communications System (“NCS”) to actively and aggressively promote GETS, WPS and TSP to all eligible government, public safety, and critical industry groups.
 - *Maximizing Existing Resources – Broadening NCC to Include All Communications Infrastructure Sectors.* The FCC should work with the NCS to broaden the membership of the National Coordination Center for Telecommunications (“NCC”) to include adequate representation of all types of communications systems, including broadcast, cable, satellite and other new technologies, as appropriate.
 - *Maximizing Existing Resources – FCC Website for Emergency Coordination Information.* The FCC should create a password-protected website, accessible by credentialed entities, listing the key state emergency management contacts, as well as post-disaster coordination areas for communications providers.
 - *Maximizing Existing Resources – FCC Website for Emergency Response Team Information.* The FCC should create a website to publicize the agency’s emergency response team’s contact information and procedures for facilitating disaster response and outage recovery.
- ***Improving the operability and interoperability of public safety and 911 communications in times of crisis.*** These recommendations include:
- *Essential Steps in Pre-positioning Equipment, Supplies and Personnel – An Emergency Restoration Supply Cache and Alternatives Inventory.* The FCC should encourage state and local jurisdictions to retain and maintain, including through arrangements with the private sector, a cache of equipment components that would be needed to immediately restore existing public safety communications. The FCC should also work with the NCC to develop inventories of alternative communications assets.
 - *Essential Steps in Enabling Emergency Communications Capabilities – Facilitating First Responder Interoperability.* The FCC should take several steps to facilitate interoperability among first responder communications, including maintaining the schedule for commercial spectrum auctions to fund the federal public safety grant programs; working with the National Telecommunications and Information Administration (“NTIA”) and the Department of Homeland Security (“DHS”) to establish appropriate criteria for these grants; encouraging the expeditious development and approval of 700 MHz regional plans; working with NTIA and DHS to develop spectrum sharing among federal, state and local agencies for emergency response purposes; and publicizing interoperability successes and best practices.

- *Essential Steps in Addressing E-911 Lessons Learned – A Plan for Resiliency and Restoration of E-911 Infrastructure and Public Safety Answering Points (“PSAPs”).* The FCC should encourage implementation of certain Network Reliability and Interoperability Council (“NRIC”) best practice recommendations to ensure more robust E-911 service. In addition, the FCC should recommend and take steps to permit the designation of a secondary back-up PSAP more than 200 miles away, as well as urge applicable federal programs to expand eligibility for 911 enhancement/interoperability grants.
- *Essential Steps in Addressing Lessons Learned Concerning Emergency Medical and Hospital Communications Needs – An Outreach Program to Educate and Include the Emergency Medical Community in Emergency Communications Preparedness.* The FCC should work to assist the emergency medical community to facilitate the resiliency and effectiveness of their emergency communications systems through education and clarification of Stafford Act classification and funding eligibility.

► ***Improving communication of emergency information to the public.*** These recommendations include:

- *Actions to Alert and Inform – Revitalize and Publicize the Underutilized Emergency Alert System.* The FCC should revitalize and publicize the underutilized EAS through education and the exploration of complementary notification technologies.
- *Actions to Alert and Inform – Commence Efforts to Ensure that Persons with Disabilities and Non-English-Speaking Americans Receive Meaningful Alerts.* The FCC should commence efforts to ensure that persons with disabilities and non-English-speaking Americans receive meaningful alerts, including resolving technical hurdles to these individual’s utilization of EAS, publicizing best practices for serving these individuals, and encouraging state and local emergency agencies to make critical emergency information accessible to persons with disabilities and non-English-speaking Americans.
- *Actions to Alert and Inform – Ensure Consistent and Reliable Emergency Information Through a Consolidated and Coordinated Public Information Program.* The FCC should work with federal, state and local agencies to ensure consistent and reliable emergency information through a consolidated and coordinated public information program.

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The Katrina Panel commends Chairman Martin and the Commission for their actions to assist industry and first responders before, during and after Hurricane Katrina and for forming this Panel to identify steps to be taken to enhance readiness and recovery in the future. The Panel hopes that its observations and recommendations prove useful to the Commission and assist our Nation in preparing for and responding to future hurricanes and any other disasters that might lay ahead for us.

INTRODUCTION

The Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks (“Katrina Panel” or “Panel”) hereby submits its report to the Federal Communications Commission (“Commission” or “FCC”). The Panel is charged with studying the impact of Hurricane Katrina on the telecommunications and media infrastructure¹ in the areas affected by the hurricane. As directed by the Commission, this report presents the Panel’s findings as well as recommendations for improving disaster preparedness, network reliability and communications among first responders.

I. Panel Formation and Charge

On September 15, 2005, FCC Chairman Kevin J. Martin announced that he would establish an independent expert panel to review the impact of Hurricane Katrina on the communications infrastructure.² Chairman Martin made the announcement at the FCC’s Open Meeting focusing on the effects of Hurricane Katrina, which was held in Atlanta, Georgia. He stated that the Panel would be composed of public safety and communications industry representatives.³ The twenty-seven members of the Panel, reflecting that diverse composition, are identified in Appendix A. Chairman Martin appointed Nancy J. Victory of Wiley Rein & Fielding LLP, the former Assistant Secretary of Commerce for Communications and Information and Administrator of the National Telecommunications and Information Administration, to chair the Panel.⁴

In accordance with the requirements of the Federal Advisory Committee Act, the FCC published a notice announcing the establishment of the Katrina Panel in the Federal Register on January 6, 2006.⁵ The Panel’s charter details the Katrina Panel’s objectives and the scope of its activity.⁶ Specifically, the Charter directs the Panel:

¹ Throughout this report, the terms “communications infrastructure” and “communications networks” are intended to refer to both telecommunications (*e.g.*, telephony, wireless, satellite, WISP) and media (*e.g.*, radio, television, cable) infrastructure. “Communications providers” is intended to refer to the operators of these networks.

² Statement of Kevin J. Martin, Chairman, Federal Communications Commission, Open Meeting on the Effects of Hurricane Katrina, Atlanta, GA, at 3 (Sept. 15, 2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-261095A1.pdf [hereinafter “Martin Sept. 15 Statement”]; *see also* FCC Takes Steps to Assist in Hurricane Katrina Disaster Relief, 2005 FCC LEXIS 5109 (rel. Sept. 15, 2005) (Commission news release).

³ Martin Sept. 15 Statement at 3.

⁴ Chairman Kevin J. Martin Names Nancy J. Victory as Chair of the Federal Communication Commission’s Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, 2005 FCC LEXIS 6514 (rel. Nov. 28, 2005) (Commission news release).

⁵ *See* Federal Communications Commission, Federal Advisory Committee Act, Notice, 71 Fed. Reg. 933 (Jan. 6, 2006), *available at* <http://www.fcc.gov/eb/hkip/hkipnoe.pdf>. Access to the public comments filed with and notices generated by the Katrina Panel (unless otherwise noted with a URL designation in the citations which follow) is through the Panel’s website, *available at* <http://www.fcc.gov/eb/hkip/>.

- to study the impact of Hurricane Katrina on all sectors of the telecommunications and media industries, including public safety communications;
- to review the sufficiency and effectiveness of the recovery effort with respect to this infrastructure; and
- to make recommendations to the Commission by June 15, 2006 regarding ways to improve disaster preparedness, network reliability, and communication among first responders such as police, fire fighters, and emergency medical personnel.⁷

Pursuant to the Charter, the Panel became operational on January 9, 2006. The Charter also provides that the Panel will terminate on June 15, 2006 and must carry out its duties before that date.

II. Process and Activities of the Panel

In order to gather information to fulfill the directives of its Charter, the Panel called upon the experiences of its members, many of whom were directly involved in the recovery efforts following Hurricane Katrina. The Panel also solicited broad public input by providing processes by which interested parties could submit written comments⁸ and provide oral presentations.⁹ The Panel additionally invited certain experts to present to the Panel or demonstrate new technologies and applications. The written comments received by the Panel, as well as transcripts of the Panel's meetings, are publicly available at the FCC's Public Reference Room and on the Panel's website. Finally, the Panel also reviewed publicly available information regarding matters under the Panel's consideration.

The Panel met five times to hear oral presentations, to discuss draft findings and recommendations, and to finalize and approve this report. Those meetings occurred on January 30, March 6-7, April 18, May 12, and June 9, 2006. The March 6-7 meeting was held in Jackson, Mississippi, where the Panel was able to hear oral presentations by interested parties. All other meetings of the Panel occurred in Washington, DC. All of these meetings were public, with prior notice of their date, time and location provided to the public.¹⁰

⁶ See FCC Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, Charter (filed Jan. 9, 2006), available at <http://www.fcc.gov/eb/hkip/HKIPCharter.pdf>.

⁷ *Id.* at 1-2.

⁸ See, e.g., Federal Communications Commission, Federal Advisory Committee Act; Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, Notice of opportunity to provide oral presentations, 71 Fed. Reg. 5846 (Feb. 3, 2006), available at <http://a257.g.akamai.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/pdf/06-1057.pdf>.

⁹ *Id.*

¹⁰ See, e.g., Notice of Appointment Of Members To Serve On Federal Communications Commission's Independent Panel Reviewing The Impact Of Hurricane Katrina On Communications Networks; And Independent Panel's First Meeting Scheduled For January 30, 2006, Public Notice, 21 FCC Rcd 197 (2006). The Commission

The Panel formed informal working groups (“IWGs”), made up of small numbers of Panel members, to help it effectively review and process the necessary information within the time required. The working groups met numerous times in person and telephonically during the Panel’s existence. These working groups were not decision-making bodies. Rather, they compiled and sorted information in particular issue areas for presentation to the full Panel. The Panel had three informal working groups:

- *IWG-1: Infrastructure Resiliency.* This working group focused its discussions and efforts on four main areas: (1) reviewing how and why certain portions of the communications networks failed; (2) identifying which portions of the communications networks continued to work and withstood the hurricane and why; (3) examining how communications technology can be made less vulnerable to failing; and (4) studying what steps can be taken, pre-event, to strengthen the communications infrastructure. Marion Scott, Vice President - Operations, CenturyTel, served as the Chair of this working group and Steve Dean, Fire Chief of Mobile, Alabama, served as Vice-Chair.
- *IWG-2: Recovery Coordination and Procedures.* This working group focused on seven main issues: (1) examining ways to increase the speed with which communications networks can be restored post-event; (2) reviewing whether communications technology could have been used more effectively during the recovery period, including issues relating to consumer education and post-event deployment of communications technology; (3) reviewing the intra-industry procedures that communications providers use to coordinate recovery efforts; (4) reviewing the industry-government procedures that private communications firms and federal, state and local governments use to coordinate recovery efforts; (5) studying ways that private industry can obtain faster and more efficient access to impacted areas; (6) reviewing the security and protection procedures utilized by private communications industry members when they send their first responders to impacted areas; and (7) reviewing how well emergency communications services, including Telecommunications Service Priority, Government Emergency Telecommunications Service, and Wireless Priority Service, performed during Katrina and the extent to which emergency responders used these services. Steve Davis, Senior Vice President - Engineering, Clear Channel Radio, served as the Chair of this working group and Lt. Colonel Joseph Booth, Deputy Superintendent, Louisiana State Police, served as Vice-Chair.
- *IWG-3: Emergency Communications.* This working group focused on six main issues: (1) identifying means for ensuring or enabling rapid deployment of interoperable communications in the wake of an event like Hurricane Katrina that can be implemented in the short term; (2) identifying any coordination that needs to occur among public safety entities to facilitate implementation of such a system in the wake of a disaster; (3) reviewing Hurricane Katrina’s impact on the Gulf Coast Region’s 911 and E-911

also published notices in the Federal Register announcing Panel meetings. See, e.g., Federal Communications Commission, Federal Advisory Committee Act; Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, Notice of public meeting, 71 Fed. Reg. 2233 (Jan. 13, 2006). The Panel’s website at <http://www.fcc.gov/eb/hkip/Meetings.html> contains more information about meeting notices.

systems; (4) reviewing the impact of the hurricane on PSAPs and the procedures used to re-route emergency calls; (5) examining whether and how the communications networks could have provided greater 911 connectivity for private citizens; and (6) reviewing the adequacy of emergency communications to the public before, during and after the hurricane, and the best ways to alert and inform the public about emergencies in the future. Steve Delahousey, Vice President - Operations, American Medical Response, served as the Chair of this working group and Jim Jacot, Vice President, Cingular Network Group, served as Vice-Chair.

Typically, discussion about various findings and recommendations occurred first within the working groups. The working groups then presented draft findings and recommendations to the full Panel for further discussion. Certain issues were referred back to the working groups for additional discussion and revision.

The Panel held its final meeting on June 9, 2006. During this meeting, the Panel discussed the final draft report, including recommendations to the Commission. The Panel then unanimously approved this report for submission to the Commission.¹¹

¹¹ The Panel would like to recognize and express appreciation to Lisa Fowlkes and Jean Ann Collins, the Designated and Alternate Designated FACA Officers for the Panel, for their important contributions in enabling the Panel to carry out its mission under the Charter. In addition, the Panel would like to thank Michael A. Lewis, Thomas Dombrowsky, and Brendan T. Carr of Wiley Rein & Fielding LLP for their considerable assistance in preparing this report.

PANEL OBSERVATIONS REGARDING THE IMPACT OF HURRICANE KATRINA ON THE COMMUNICATIONS SECTOR AND THE SUFFICIENCY AND EFFECTIVENESS OF THE RECOVERY EFFORT

The Katrina Panel has been charged with studying the impact of Hurricane Katrina on all sectors of the telecommunications and media industries, including public safety communications. The Panel has also been directed to review the effectiveness of the recovery effort with respect to this infrastructure. To inform its views on these issues, the Panel heard oral presentations and reviewed written comments from numerous government and industry representatives, as well as other interested members of the public. The Panel members also brought to bear their own experiences with Hurricane Katrina and its aftermath. As a result of digesting and discussing all of this information, the Panel members identified a number of areas where problems were observed or communications recovery and restoration efforts could have been more effective. The Panel also identified areas where successes were achieved – successes that should be repeated. These observed problems and successes, which are detailed below, generally formed the basis for the Panel's recommendations to the Commission.

The Panel's observations below are divided into four sections. Section I, Network Reliability and Resiliency, discusses the successes and failures in the resiliency and reliability of various types of communications networks from an operational perspective. This section looks at the effects of both the hurricane itself and the subsequent levee breaches on communications infrastructure. Section II, Recovery Coordination and Procedures, reviews the challenges communications infrastructure providers encountered in restoring and maintaining communications service, particularly with regard to access and credentialing issues, restoration of power, and security. Section III, First Responder Communications, examines the challenges posed to public safety and emergency first responders in the days following Hurricane Katrina. And finally Section IV, Emergency Communication to the Public, focuses on the adequacy and effectiveness of emergency communications to the public before, during and after Hurricane Katrina.

I. Network Reliability and Resiliency

The sheer force of Hurricane Katrina and the extensive flooding resulting from the breached levees severely tested the reliability and resiliency of communications networks in the Gulf Coast region. Katrina also affected areas of the Gulf Coast in varied fashions. In the high impact zones near Gulfport, MS and New Orleans, LA, the hurricane created much heavier damage to the infrastructure due to strong winds and, in New Orleans, extensive flooding in the days after the storm. In less impacted areas, damage was less severe and recovery efforts were more easily accomplished. Katrina taxed each type of communications infrastructure in a variety of ways: (1) strong winds and rain made it difficult for technical staff to support and maintain the networks and blew antennas out of alignment; (2) heavy flooding following Katrina overwhelmed a large portion of the communications infrastructure, damaging equipment and impeding recovery; (3) single points of failure in vital communications links led to widespread communications outages across a variety of networks; and (4) the duration of power outages far

outlasted most generator fuel reserves, leading to the failure of otherwise functional infrastructure. However, there were resiliency successes in the aftermath: (1) a large portion of the communications infrastructure withstood the storm's wind and rain with only minor damage (as distinguished from post-storm flooding from levee breaches and power outages, which had a more devastating impact); (2) satellite networks, although taxed by extensive numbers of additional users, remained available and usable throughout the affected region; and (3) the communications networks operated by utilities appeared to have a very high rate of survivability. By examining the failures in network resiliency and reliability, along with the successes, we can better prepare communications infrastructure to withstand or quickly recover from future catastrophic events.

A. Effect of Hurricane Katrina on Various Types of Communications Networks.

Hurricane Katrina and its aftermath had a devastating impact on communications networks in the Gulf Coast region. In the affected areas of Louisiana, Mississippi and Alabama, more than three million customer telephone lines were knocked out of service. Both switching centers and customer lines sustained damage. Thirty-eight 911 call centers went down. Approximately 100 broadcast stations were unable to transmit and hundreds of thousands of cable customers lost service.¹² Even generally resilient public safety networks experienced massive outages. In short, Katrina had a catastrophic impact over a huge geographic area. Further, due to the unique circumstances associated with this disaster, repair and activation of the communications infrastructure in the region was not a matter of days, but rather a long and slow process.

To understand the precise impact that Hurricane Katrina had on communications networks, it is useful to distinguish between the impact of the storm itself (*i.e.*, hurricane force winds and rain) and the effect of what came later – extensive flooding from breached levees and widespread, long term power outages. As detailed below, it appears that most communications infrastructure in the areas impacted by Katrina fared fairly well through the storm's wind and rain, in most cases sustaining only minor damage or damage that should have been promptly repairable. Indeed, the tower industry reported that of all the towers in the path of the 2005 hurricanes in the Southeastern and Gulf Coast areas of the United States, less than 1 percent suffered any structural damage.¹³ The coastal areas that bore the brunt of the storm suffered the worst infrastructure damage from the hurricane. Not to diminish the significant impact of the hurricane itself, what made Katrina unique and particularly catastrophic were the unique conditions after the winds subsided – substantial flooding and widespread, extended power outages. These developments impacted communications networks greatly, causing irreparable damage to submerged electronics and prolonged outages in many cases. The Panel's observations on how each type of communications infrastructure withstood Katrina and its challenging aftermath is presented below.

¹² See Written Statement of Kevin J. Martin, Chairman, Federal Communications Commission, Hearing on Public Safety Communications from 9/11 to Katrina: Critical Public Policy Lessons, Before the Subcommittee on Telecommunications and the Internet, Committee on Energy and Commerce, United States House of Representatives, at 2 (Sept. 29, 2005), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-261417A1.pdf [hereinafter "Martin Sept. 29 Written Statement"].

¹³ See Comments of PCIA – The Wireless Infrastructure Association, at 1 (May 15, 2006).

1. **Public Safety Communications Networks.** Public safety communications networks are generally built to be reliable in extreme conditions.¹⁴ To ensure this, the systems are planned to accommodate everyday peak service times as well as large incidents. They are also designed to account for radio system disruptions, such as power outages, transmission failures, system interconnect failures, and personal radio equipment failures. However, these systems are generally not designed for widespread catastrophes of long duration – the situation resulting from Katrina.¹⁵ As a result of the storm and its aftermath, public safety networks in the Gulf states experienced a large number of transmission outages that impacted the functionality of both primary and back-up systems. The loss of power and the failure of switches in the wireline telephone network also had a huge impact on the ability of public safety systems to function.¹⁶ Public safety personnel’s apparent lack of familiarity with the operation of back-up or alternate systems (such as satellite systems) also limited functionality.

a. **Tower Failures.** In general, public safety’s antenna towers remained standing after the storm. The winds did blow antennas out of alignment, requiring readjustment. However, the main cause of transmission failures was loss of power (as discussed below). Most public safety radio systems by design are able to handle and manage a single or isolated subsystem failure or loss.¹⁷ However, Katrina affected parts of four states, causing transmission losses at a much greater number and over a larger area than public safety planning had envisioned.

b. **Power Failures.** Power for radio base stations and batterychargers for portable radio devices are carefully planned for public safety systems. However, generators are typically designed to keep base stations operating for 24 to 48 hours. The long duration of power outages in the wake of Katrina substantially exceeded the capabilities of most of public safety’s back-up generators and fuel reserves.¹⁸ Similarly, portable radios and back-up batteries generally have an 8 to 10 hour duty cycle.¹⁹ Without access to power to recharge the devices and backup batteries, portable devices quickly ran out of power.

c. **Wireline and Network Infrastructure Failures.** Katrina and the subsequent levee breaches caused significant failures of the Public Switched Telephone Network (“PSTN”), particularly in the New Orleans area.²⁰ Public safety radio networks rely on interconnection with the PSTN or by fixed microwave links to get communications through to

¹⁴ See, e.g., Written Statement of Chief Harlin R. McEwen, Chairman, Communications and Technology Committee, International Association of Chiefs of Police, at 2 (Mar. 6, 2006) [hereinafter “McEwen Mar. 6 Written Statement”].

¹⁵ *Id.* at 4.

¹⁶ See *id.* at 6.

¹⁷ See *id.* at 5.

¹⁸ See *id.*

¹⁹ *Id.* at 6.

²⁰ *Id.*

public safety responders. Given PSTN failures, as well as damage to fixed microwave links, public safety communications were significantly affected.

d. *Training Issues.* Because of failures of the primary public safety networks, public safety personnel had to utilize back-up or alternative communications technologies with which they may not have had substantial experience. Confusion or unfamiliarity with the capabilities or operational requirements of the alternative technology seemed to result in limitations in functionality.²¹ For example, some public safety personnel handed satellite phones were not familiar with their special dialing requirements and, as a result, thought the phones did not work.²² Public safety personnel did not seem to have adequate training on alternative communications technologies, such as paging, satellite, license-exempt WISP systems, and thus were not able to transition seamlessly to these alternatives when existing public safety communications networks failed. Additionally, because alternative technologies were used so infrequently, there were reported problems with upkeep and maintenance of the equipment.²³

2. *Public Safety Answering Points (PSAPs).* Handling of 911 calls was identified as a problem during Katrina. As a result of the storm and subsequent flooding, thirty-eight 911 call centers ceased to function.²⁴ Limited training and advanced planning on how to handle rerouting of emergency calls under this situation created serious problems.²⁵ As an example, the City of Biloxi was able to relocate their 911 call center prior to landfall; however, representatives relocated to the facility did not have full 911 capabilities. This severely hampered their ability to effectively route 911 calls to the appropriate agencies. The Katrina experience identified that there appeared to be a lack of 911 PSAP failovers and some deficits in training on routing and handling of calls when a crisis and rerouting occurs. Nevertheless, the vast majority of 911 call centers, especially in the less impacted portions of the region, were up and running by September 9.²⁶

3. *Wireline.* According to FCC data, more than 3 million customer phone lines were knocked out in the Louisiana, Mississippi and Alabama area following Hurricane Katrina.²⁷ The wireline telephone network sustained significant damage both to the switching

²¹ See, e.g., Oral Testimony of Dr. Sandy Bogucki, U.S. Department of Health and Human Services, Tr. at 54-55 (Mar. 6, 2006) [hereinafter "Bogucki Mar. 6 Oral Testimony"].

²² Written Testimony of David Cavossa, Executive Director, Satellite Industry Association, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, at 4-5 (Mar. 3, 2006) [hereinafter "Cavossa-SIA Written Testimony"]; Bogucki Mar. 6 Oral Testimony, Tr. at 55.

²³ See Bogucki Mar. 6 Oral Testimony, Tr. at 55.

²⁴ See Martin Sept. 29 Written Statement at 2.

²⁵ See, e.g., Comments of Comcare at 2 (May 11, 2006) (there was no plan to bring in additional telecommunicators to the region to keep up with the influx of 911 calls from victims and rescue response teams).

²⁶ See Martin Sept. 29 Written Statement at 27.

²⁷ See Written Statement of Kenneth P. Moran, Director, Office of Homeland Security, Enforcement Bureau, FCC, on Hurricane Katrina, Before the Committee on Energy and Commerce, United States House of

centers that route calls and to the lines used to connect buildings and customers to the network.²⁸ Katrina highlighted the dependence on tandems and tandem access to SS7 switches.²⁹ The high volume routes from tandem switches, especially in and around New Orleans were especially critical and vulnerable. Katrina highlighted the need for diversity of call routing and avoiding strict reliance upon a single routing solution. One tandem switch, which was critical for 911 call routing, was lost from September 4 to September 21. This switch went down due to flooding that did not allow for fuel to be replenished. Due to the high winds and severe flooding, there were multiple breaks in the fiber network supporting the PSTN. Katrina demonstrated that in many areas there may be a lack of multiple fiber routes throughout the wireline network and that aerial fiber was more at risk than underground fiber. As with other private sector communications providers, lack of access to facilities (due to both flooding and inadequate credentialing), lack of commercial power, and lack of security greatly hampered recovery efforts. Nevertheless, ten days after Katrina, nearly 90 percent of wireline customers in the Gulf region who had lost service had their service restored.³⁰ However, the vast majority of these customers were in the less impacted regions of the Gulf; regions that were harder hit sustained more infrastructure damage and continued to have difficulty in restoring service.

4. **Cellular/PCS.** Local cellular and personal communications service (“PCS”) networks received considerable damage with more than 1000 base station sites impacted.³¹ In general, cellular/PCS base stations were not destroyed by Katrina, although some antennas required adjustment after the storm. Rather, the majority of the adverse effects and outages encountered by wireless providers were due to a lack of commercial power or a lack of transport connectivity to the wireless switch (wireline T1 line lost or fixed microwave backhaul offline). The transport connectivity is generally provided by the local exchange carrier. With either failure, wireless providers would be required to make a site visit to return the base station to operational status. Wireless providers cited security for their personnel, access and fuel as the most pressing needs and problems affecting restoration of wireless service. However, within one week after Katrina, approximately 80 percent of wireless cell sites were up and running.³² Consistent with other systems, the 20 percent of base stations still affected were in the areas most impacted by Katrina. Cellular base stations on wheels (“COWs”) were successfully used as needed to restore service throughout the affected region. Over 100 COWs were delivered to the Gulf Coast region.³³ In addition to voice services, text messaging was used successfully during

Representatives, at 2 (Sept. 7, 2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-260895A1.pdf [hereinafter “Moran Sept. 7 Written Statement”].

²⁸ *Id.* at 2-3.

²⁹ *See, e.g.*, Oral Testimony of Woody Glover, Director, St. Tammany Parish Communications District, Tr. at 64-67 (Mar. 6, 2006) [hereinafter “Woody Glover Mar. 6 Oral Testimony”].

³⁰ Martin Sept. 29 Written Statement at 43.

³¹ Moran Sept. 7 Written Statement at 3.

³² Martin Sept. 29 Written Statement at 44.

³³ S. Comm. on Homeland Security and Gov’t Affairs, 109th Cong., Hurricane Katrina: A Nation Still Unprepared at 18-4, May 2006, *available at* <http://hsgac.senate.gov/files/Katrina/FullReport.pdf> [hereinafter “Senate Report on Katrina”].

the crisis and appeared to offer communications when the voice networks became overloaded with traffic. Additionally, wireless providers' push-to-talk services appeared to be more resilient than interconnected voice service inasmuch as they do not necessarily rely upon connectivity to the PSTN.³⁴

5. **Paging.** Paging systems seemed more reliable in some instances than voice/cellular systems because paging systems utilize satellite networks, rather than terrestrial systems, for backbone infrastructure.³⁵ Paging technology is also inherently redundant, which means that messages may still be relayed if a single transmitter or group of transmitters in a network fails.³⁶ Paging signals penetrate buildings very well, thus providing an added level of reliability.³⁷ Additionally, pagers benefited from having a long battery life and thus remained operating longer during the power outages.³⁸ Other positive observations concerning paging systems included that they were effective at text messaging and were equipped to provide broadcast messaging.³⁹ Finally, although it is unclear whether this function was utilized, group pages can be sent out during times of emergencies to alert thousands of pager units all at the same time.⁴⁰

6. **Satellite.** Satellite networks appeared to be the communications service least disrupted by Hurricane Katrina.⁴¹ As these networks do not heavily depend upon terrestrial-based infrastructure, they are typically not affected by wind, rain, flooding or power outages.⁴² As a result, both fixed and mobile satellite systems provided a functional, alternative

³⁴ See Written Testimony of Dave Flessas, VP, Network Operations, Sprint Nextel Corp, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, at 3 (Jan. 30, 2006) [hereinafter "Sprint Nextel Jan. 30 Written Testimony"].

³⁵ See, e.g., Written Testimony of Vincent D. Kelly, President and Chief Executive Officer, USA Mobility, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina at 7 (Mar. 6, 2006) [hereinafter "Vincent Kelly-USA Mobility Mar. 6 Written Testimony"]; Oral Testimony of Bruce Deer, President, American Association of Paging Carriers, Tr. at 122-123 (Mar. 6, 2006) [hereinafter "Deer Mar. 6 Oral Testimony"].

³⁶ See, e.g., Vincent Kelly-USA Mobility Mar. 6 Written Testimony at 7-8.

³⁷ Deer Mar. 6 Oral Testimony, Tr. at 123.

³⁸ *Id.*

³⁹ See, e.g., Vincent Kelly-USA Mobility Mar. 6 Written Testimony at 3.

⁴⁰ See, e.g., Comments of Interstate Wireless, Inc., at 1 (May 10, 2006).

⁴¹ See, e.g., Comments of Globalstar LLC, at 1 (Jan. 27, 2006) [hereinafter "Globalstar Comments"].

⁴² See, e.g., Senate Report on Katrina at 18-9 ("satellite phones do not rely on terrestrial . . . infrastructure that is necessary for land mobile radio, land-line, and cellular communications"); Written Statement of Tony Trujillo, Chairman, Satellite Industry Association, Hearing on Public Safety Communications From 9/11 to Katrina: Critical Public Policy Lessons, Before the Subcommittee on Telecommunications and the Internet, Committee on Energy and Commerce, United States House of Representatives, at 3 (Sept. 29, 2005), available at <http://energycommerce.house.gov/108/09292005Hearing1648/Trujillo.pdf> [hereinafter "Trujillo Sept. 29 Written Statement"].

communications path for those in the storm-ravaged region.⁴³ Mobile satellite operators reported large increases in satellite traffic without any particular network/infrastructure issues.⁴⁴ More than 20,000 satellite phones were deployed to the Gulf Coast region in the days following Katrina.⁴⁵ Broadband capacity was provided by fixed satellite operators for voice, video and data network applications. Nevertheless, there were functionality issues with satellite communications – largely due to lack of user training and equipment preparation.⁴⁶ Some satellite phones require specialized dialing in order to place a call. They also require line of sight with the satellite and thus do not generally work indoors.⁴⁷ Users who had not been trained or used a satellite phone prior to Katrina reported frustration and difficulty in rapid and effective use of these devices.⁴⁸ Satellite phones also require charged batteries. Handsets that were not charged and ready to go were of no use as there was often no power to recharge handsets. Additionally, most of Louisiana's parishes (all but three) did not have satellite phones on hand because they had previously chosen to discontinue their service as a cost-saving measure.⁴⁹ Finally, users expressed the observation that satellite data networks (replacing wireline T1 service) were more robust and had fewer difficulties in obtaining and maintaining communications with the satellite network than voice services.

7. Broadcasting. The television and radio broadcasting industry was also hard hit by Katrina. Approximately 28 percent of television stations experienced downtime in the storm zone; approximately 35 percent of radio stations failed in one fashion or another.⁵⁰ In

⁴³ See, e.g., Written Statement of Colonel Jeff Smith, Deputy Director, Louisiana Office of Homeland Security and Emergency Preparedness, Hurricane Katrina: Preparedness and Response by the State of Louisiana, Before the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, United States House of Representatives, at 12 (Dec. 14, 2005), *available at* http://katrina.house.gov/hearing/12-14-05/smith_121405.doc [hereinafter "Jeff Smith Written Statement"]; Written Statement of Bruce Baughman, Director, Alabama State Emergency Management Agency, Hurricane Katrina: Preparedness and Response by the State of Alabama, Before the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, United States House of Representatives, at 4 (Nov. 9, 2005), *available at* http://katrina.house.gov/hearings/11_09_05/baughman_110905.doc; Written Statement of Robert Latham, Director, Mississippi Emergency Management Agency, Hurricane Katrina: Preparedness and Response by the State of Mississippi, Before the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, United States House of Representatives, at 4 (Dec. 7, 2005), *available at* http://katrina.house.gov/hearings/12_07_05/latham_120705.pdf.

⁴⁴ Globalstar Comments at 2.

⁴⁵ Trujillo Sept. 29 Written Statement at 4.

⁴⁶ See, e.g., Senate Report on Katrina at 18-9 (problems with satellite phones do not appear to have been caused by the phones themselves or the satellite networks; a combination of user error and obstruction of satellite signals were most likely the problems); Cavossa-SIA Testimony at 4-5; Bogucki Mar. 6 Public Testimony, Tr. at 55.

⁴⁷ Cavossa-SIA Written Testimony at 5.

⁴⁸ *Id.* at 4.

⁴⁹ See Final Report of the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, H.R. Rep. No. 109-377, at 172-73 (2006), *available at* <http://www.gpo.access.gov/serialset/creports/Katrina.html>, [hereinafter "House Report"].

⁵⁰ See, e.g., Martin Sept. 29 Written Statement at 45; Written Statement of Kevin J. Martin, Chairman, Federal Communications Commission, Hearing on Communications in a Disaster, Before the Senate Comm. on

addition, in New Orleans and the surrounding area, only 4 of the 41 broadcast radio stations remained on the air in the wake of the hurricane.⁵¹ Some broadcasters continued broadcasting only by partnering with other broadcasters whose signals were not interrupted.⁵² Broadcasters reported very few tower losses as a result of Katrina. Instead, the wind displacing and causing misaligning antennas was the biggest cause of broadcast outages. Although this type of damage could be readily repaired, the lengthy power outages – which substantially exceeded back-up generator capabilities – prevented many broadcast stations from coming back on the air. Power outages at the viewer/listener end were also an issue as they prevented broadcast transmissions from being successfully received. Additionally, the lack of security for broadcast facilities and repair personnel impeded recovery efforts. Nevertheless, within three weeks after Katrina, more than 90 percent of broadcasters were up and running in the affected region.⁵³ However, in the areas most impacted by the storm, the vast majority of stations remained down much longer.

8. **Cable.** As with the broadcasting industry, cable companies in the region reported limited infrastructure damage to their head ends following Katrina. In the areas hardest hit by the storm itself, aerial cable infrastructure was heavily damaged. Some cable facilities are underground; the storm's wind and rain had only minimal effects on them. However, the opposite was true in areas where the levees' breach caused heavy flooding. There, underground facilities were heavily damaged and the electronics in those facilities were generally completely lost. The cable industry indicated that new cable plants generally allowed for multiple points of failure and system workarounds that permitted the network to operate in spite of some widespread faults in the infrastructure. However, lack of power to cable facilities and security proved to be key problems. The cable operator serving New Orleans indicated that, even where its network was intact, lack of power/fuel prevented it from restoring operations in those areas.⁵⁴ Also, similar to broadcasting, power outages at the viewer end prevented cable programming from being successfully received.

9. **Utilities.** Electric utility networks (including utility-owned commercial wireless networks) appeared to have a high rate of survivability following Katrina.⁵⁵ These communications systems did not have a significant rate of failure because: (1) the systems were designed to remain intact to aid restoration of electric service following a significant storm event; (2) they were built with significant onsite back-up power supplies (batteries and generators); (3) last mile connections to tower sites and the backbone transport are typically owned by the utility

Commerce, Science, and Transportation at 2 (Sept. 22, 2005) (an estimated 100 broadcast stations were knocked off the air).

⁵¹ Moran Sept. 7 Written Statement at 3.

⁵² Oral Testimony of Dave Vincent, Station Manager, WLOX-TV, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, Tr. at 309 (Mar. 6, 2006) [hereinafter "Vincent-WLOX-TV Mar. 6 Oral Testimony"] (WLOX in Biloxi partnered with WXXV in Gulfport, Mississippi, which carried WLOX's signal until they could get back on the air).

⁵³ Martin Sept. 29 Written Statement at 45.

⁵⁴ See, e.g., Comments of Greg Bicket, Cox Communications, at 1 (Jan. 27, 2006).

⁵⁵ See, e.g., UTC Comments, Hurricanes of 2005: Performance of Gulf Coast Critical Infrastructure Communications Networks, at 2 (Jan. 27, 2006).

and have redundant paths (both T1 and fixed microwave); and (4) the staff responsible for the communications network have a focus on continuing maintenance of network elements (for example, exercising standby generators on a routine basis).

10. License Exempt Wireless (WISPs). The License Exempt Wireless or wireless internet service provider (“WISP”) infrastructure, in general, was not heavily damaged by Katrina or the subsequent flooding, although some antennas required adjustment because of high winds. Rather, the majority of the adverse effects and outages encountered by WISP providers were due to a lack of commercial power and difficulty with fuel resupply. WISP providers cited access difficulties as their most pressing problem in restoring their networks.

11. Amateur Radio Service. As with other communications services, amateur radio stations were also adversely affected by Katrina. Equipment was damaged or lost due to the storm and trained amateurs were difficult to find in the immediate aftermath. However, once called into help, amateur radio operators volunteered to support many agencies, such as FEMA, the National Weather Service, Hurricane Watch and the American Red Cross.⁵⁶ Amateurs provided wireless communications in many locations where there was no other means of communicating and also provided other technical aid to the communities affected by Katrina.⁵⁷

B. Major Problems Identified Following Katrina.

In reviewing the detailed reports from each communications sector, there were three main problems that caused the majority of communications network interruptions: (1) flooding; (2) lack of power and/or fuel; and (3) failure of redundant pathways for communications traffic. In addition, a fourth item – inadvertent line cuts during restoration – resulted in additional network damage, causing new outages or delaying service restoration. Each of these areas of concern is detailed below.

1. Flooding. Hurricanes typically have flooding associated with them due to the torrential rainfall and storm surge associated with the storms. However, in addition to these sources of flooding, the levee breaks in New Orleans caused catastrophic flooding that was extremely detrimental to the communications networks.⁵⁸ While communications infrastructure had been hardened to prepare against strong winds from a hurricane, the widespread flooding of long duration associated with Katrina destroyed or disabled substantial portions of the communications networks and impeded trained personnel from reaching and operating the facilities.⁵⁹ In addition, as detailed below, the massive flooding caused widespread power outages that were not readily remedied (electric substations could not be reached nor were there

⁵⁶ See Hurricane Katrina Amateur Radio Emergency Communications Relief Effort Operations Review Summary, Written Statement submitted by Gregory Sarratt, W4OZK, at 2 (Mar. 7, 2006).

⁵⁷ *Id.* at 4.

⁵⁸ See, e.g., House Report at 164 (reporting that flooding knocked out two telephone company switches and hindered the communications abilities of six out of eight police districts in New Orleans, as well as the police department headquarters).

⁵⁹ See, e.g., Oral Testimony of Dr. Juliette M. Saussy, Director, Emergency Medical Services of the City of New Orleans, Louisiana, Tr. at 43-44 (Mar. 6, 2006) [hereinafter “Saussy Mar. 6 Oral Testimony”].

personnel available to remedy the outages). The flooding also wiped out transportation options, preventing fuel for generators from getting where it needed to be.

2. Power and Fuel. Katrina caused extensive damage to the power grid. Significant portions of electrical facilities in Mississippi, Alabama and Louisiana – including both power lines and electric plants – were severely impaired due to wind and flooding. As a result, power to support the communications networks was generally unavailable throughout the region.⁶⁰ This meant that, for communications systems to continue to operate, backup batteries and generators were required. While the communications industry has generally been diligent in deploying backup batteries and generators and ensuring that these systems have one to two days of fuel or charge, not all locations had them installed. Furthermore, not all locations were able to exercise and test the backup equipment in any systemic fashion. Thus, some generators and batteries did not function during the crisis. Where generators were installed and operational, the fuel was generally exhausted prior to restoration of power. Finally, flooding, shortages of fuel and restrictions on access to the affected area made refueling extraordinarily difficult.⁶¹ In some instances, fuel was confiscated by federal or local authorities when it was brought into the Katrina region.⁶²

3. Redundant pathways. The switches that failed, especially tandems, had widespread effects on a broad variety of communications in and out of the Katrina region. In addition, T1 and other leased lines were heavily used by the communications networks throughout the region, with those failures leading to loss of service. As an example, a major tandem switch in New Orleans was isolated, which meant that no communications from parts of New Orleans to outside the region could occur. This switch, an access tandem that carried long distance traffic through New Orleans and out to other offices, had two major routes out of the city (one to the east and one to the west). The eastern route was severed by a barge that came ashore during the hurricane and cut the aerial fiber associated with the route. If only this route had been lost, the access tandem traffic could have continued. However, the western route was also severed – initially by large trees falling across aerial cables, then subsequently by construction crews removing debris from highway rights-of-way. While there were provisions for rerouting traffic out of the city, the simultaneous loss of both of these major paths significantly limited communications service in parts of New Orleans.

4. Line cuts. During the restoration process following Katrina, there were numerous instances of fiber lines cut accidentally by parties seeking to restore power, phone, and cable, remove trees and other debris, and engage in similar restoration activities.⁶³ BellSouth indicated in its comments to the Katrina Panel that several of its major routes were cut multiple

⁶⁰ House Report. at 166.

⁶¹ *Id.* at 164.

⁶² See, e.g., Senate Report on Katrina at 18-4 (citing Committee staff interview of William Smith, Chief Technology Officer, BellSouth, conducted on Jan. 25, 2006) (FEMA commandeered communications fuel reserves in order to refuel helicopters).

⁶³ See, e.g., Woody Glover Mar. 6 Oral Testimony, Tr. at 66 (Mar. 6, 2006).

times.⁶⁴ For example, on Monday, September 12th, a major fiber route from Hammond, Louisiana to Covington, Louisiana was cut by a tree trimming company.⁶⁵ Cox Communications reported that, by the eleventh day after the storm, more outages of its network in the region were caused by human damage than storm damage. Public safety entities also noted similar cuts in service during the restoration process.⁶⁶

In addition to these major causes of network interruptions, security and access to facilities were consistently mentioned as significant issues affecting restoration of communications services. These problems are discussed in detail in the following section.

II. Recovery Coordination and Procedures

After Katrina's wind and rain subsided, challenges to communications service maintenance and restoration continued. Flooding, which submerged and damaged equipment and blocked access for restoration, was a major problem. The Panel also observed significant challenges to the recovery effort resulting from (1) inconsistent and unclear requirements for communications infrastructure repair crews and their subcontractors to gain access to the affected area; (2) limited access to power and/or generator fuel; (3) limited security for communications infrastructure and personnel and lack of pre-positioned back-up equipment; (4) lack of established coordination between the communications industry and state and local officials as well as among federal, state and local government officials with respect to communications matters; and (5) limited use of available priority communications services. On the other hand, lines of communication between the communications industry and the federal government were established and seemed generally effective in facilitating coordination, promptly granting needed regulatory relief, and gathering outage information. In addition, *ad hoc*, informal sharing of fuel and equipment among communications industry participants helped to maximize the assets available and bolster the recovery effort. However, additional industry coordination of personnel and assets internally and among governments could have substantially facilitated restoration of communications networks.

A. Access to the Affected Area and Key Resources.

1. Perimeter Access and Credentialing. Communications restoration efforts were hampered significantly by the inability of communications infrastructure repair crews and their contracted workers to access the impacted area post-disaster.⁶⁷ For important safety and

⁶⁴ See Comments by William L. Smith, BellSouth, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks, at 7 (Jan. 30, 2006) [hereinafter "Smith-BellSouth Jan. 30 Written Statement"].

⁶⁵ *Id.*

⁶⁶ See, e.g., Comments of Robert G. Bailey, National Emergency Number Association, Harris County Emergency Communications, at 1 (Jan. 30, 2006) [hereinafter "Bailey Jan. 30 Written Testimony"].

⁶⁷ See, e.g., Oral Testimony of William L. Smith, Chief Technology Officer, BellSouth Corp., Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, Tr. at 188 (Jan. 30, 2006) [hereinafter "Smith-BellSouth Jan. 30 Oral Testimony"]; see also Statement of Jim Jacot, Vice President, Cingular Network Group, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, Tr. at 125 (Jan. 30, 2006)

security reasons, law enforcement personnel set up a perimeter around much of the impacted region and imposed restrictions on who could access the area. Communications infrastructure repair crews from all sectors of the industry had great difficulty crossing the perimeter to access their facilities in need of repair.⁶⁸ This seemed to be a particular problem for smaller or non-traditional communications companies,⁶⁹ who tended to have lower levels of name recognition with law enforcement personnel guarding the perimeter.

Although some jurisdictions provided credentials to communications infrastructure repair crews to permit them to access the affected area, the process appeared to be unique for each local jurisdiction. Communications providers reported that credentials that permitted access through one checkpoint would not be honored at another.⁷⁰ In many cases, different checkpoints required different documentation and credentialing before permitting access.⁷¹ As a result, repair crews needed to carry multiple credentials and letters from various federal, state and local officials.⁷² There was no uniform credentialing method in place whereby one type of credential would permit access at any checkpoint.⁷³ Communications providers were also not clear about which agency had authority to issue the necessary credentials.⁷⁴ And there did not appear to be any mechanism in place for issuing credentials to those who needed them prior to Katrina making landfall.

Once communications infrastructure repair crews gained access to the impacted area, they had no guarantee they would be allowed to remain there. The enforcement of curfews and other security procedures at times interrupted repair work and required communications restoration crews to exit the area. In at least one instance, law enforcement personnel insisted that communications

[hereinafter "Jacot-Cingular Jan. 30 Oral Testimony"]; Trujillo Sept. 29 Written Statement at 9; Comments of M/A-Com at 7 (Jan. 30, 2006).

⁶⁸ See, e.g., Senate Report on Katrina at 18-4 (repair workers sometimes had difficulty gaining access to their equipment and facilities because the police and National Guard refused to let crews enter the affected area); Federal Support to Telecommunications Infrastructure Providers in National Emergencies: Designation as "Emergency Responders (Private Sector)", The President's National Security Telecommunications Advisory Committee, Legislative and Regulatory Task Force, at 7 (Jan. 31, 2006) [hereinafter "Jan. 31 NSTAC Report"].

⁶⁹ See, e.g., Comments of the Satellite Industry Association at 6 (January 27, 2006) (describing how satellite system repair crews had difficulty obtaining access to the impacted area); Comments of Xspedius Communications, LLC, at 2, 6 (Mar. 6, 2006) [hereinafter "Comments of Xspedius"].

⁷⁰ See, e.g., Senate Report on Katrina at 18-4 (citing Committee staff interview of Christopher Guttman-McCabe, Vice President, Regulatory Affairs, CTIA, conducted on Jan. 24, 2006) (industry representatives said that their technicians would benefit from having uniform credentialing that is recognized by the multiple law enforcement agencies operating in a disaster area).

⁷¹ See, e.g., Vincent-WLOX-TV Mar. 6 Written Testimony at 5 (stating that a credential that permitted access in one county was sometimes not honored in a different county).

⁷² See, e.g., Comments of Xspedius at 2-3.

⁷³ See, e.g., Senate Report on Katrina at Findings at 8 (efforts by private sector to restore communications efforts were hampered by the fact that the government did not provide uniform credentials to gain access to affected areas).

⁷⁴ See, e.g., Comments of Xspedius at 3.

technicians cease their work splicing a key telecommunications cable and exit the area in order to enforce a curfew.⁷⁵ Although such practices may have been necessary from a security standpoint, they did interrupt and hamper the recovery process.

The problems with access were not all one-sided. Law enforcement personnel also expressed frustration with the access situation, particularly with respect to the different credentials issued and not knowing what to ask for or what to honor. It was also reported that credentialed communications infrastructure repair personnel sometimes allowed non-credentialed individuals to ride in their vehicles through checkpoints, which compromised the security of the area. It also caused law enforcement personnel at the perimeter to be wary of persons seeking to access the affected area and the credentials they presented, potentially further slowing the access process.

2. **Fuel.** Problems with maintaining and restoring power for communications infrastructure significantly affected the recovery process. As described in Section I.B.2 above, many facilities could have been up and operating much more quickly if communications providers had access to sufficient fuel. The commercial power upon which the vast majority of communications networks depended for day-to-day operations was knocked out over a huge geographic area. Back-up generators and batteries were not present at all facilities. Where they were deployed, most provided only enough power to operate particular communications facilities for 24-48 hours – generally a sufficient period of time to permit the restoration of commercial power in most situations, but not enough for a catastrophe like Hurricane Katrina.

Access to fuel reserves or priority power restoration appeared extremely limited for the communications industry.⁷⁶ Only a few communications providers had stockpiles of fuel or special supplier arrangements. However, if the fuel was not located fairly near to the perimeter, it was difficult and expensive to get it where it was needed in a timely fashion. Perimeter access issues also impeded the ability to bring reserve fuel into the region. Moreover, many roads and traditional means of accessing certain facilities could not be used due to the extensive flooding that followed Hurricane Katrina. And many communications providers did not anticipate the need for alternative means of reaching their facilities. In addition, some providers reported having their limited fuel reserves confiscated by law enforcement personnel for other pressing needs.⁷⁷ Although electric and other utilities maintain priority lists for commercial power restoration, it does not appear that commercial communications providers were on or eligible for such lists. Indeed, one wireless provider speaking at the Katrina Panel's January 2006 meeting – more than 4 months after Katrina's landfall – reported that it had 23 cell sites in the impacted

⁷⁵ Smith-BellSouth Jan. 30 Oral Testimony, Tr. at 191; *see also* Jacot-Cingular Jan. 30 Oral Testimony, Tr. at 125.

⁷⁶ *See, e.g.*, Comments of Mississippi Assn. of Broadcasters at 1-2 (Jan. 27, 2006).

⁷⁷ *See, e.g., id.*; House Report at 167 (“[O]ne of Nextel’s fuel trucks was stopped at gunpoint and its fuel taken for other purposes while en route to refuel cell tower generators, and the Mississippi State Police redirected a fuel truck carrying fuel designated for a cell tower generator to fuel generators at Gulfport Memorial Hospital.”).

area still running on backup generators.⁷⁸ Most communications providers also did not appear to be able to access any government fuel reserves.

On a positive note, several companies apparently shared their reserve fuel with other communications providers who needed it, even their competitors.⁷⁹ This sharing occurred on a purely *ad hoc* basis.⁸⁰ There did not appear to be any forum or coordination area for fostering industry sharing of fuel or other equipment.

3. Security. Limited security for key communications facilities and communications infrastructure repair crews also hampered the recovery effort.⁸¹ Security concerns, both actual and perceived, led to delays in the restoration of communications networks.⁸² Communications providers reported generators being stolen from key facilities, even if they were bolted down. Lack of security for communications infrastructure repair workers at times delayed their access to certain facilities to make repairs.⁸³ Some providers employed their own security crews.⁸⁴ However, obtaining credentials to allow these individuals to access the affected area was sometimes a problem. Further, communications infrastructure repair crews generally did not receive security details from law enforcement. Clearly, law enforcement had other very significant responsibilities in the wake of Katrina. In addition, communications providers are apparently not considered “emergency responders” under the Robert T. Stafford Disaster Relief and Emergency Assistance Act⁸⁵ and the National Response Plan and thus are not eligible to receive non-monetary Federal assistance, like security protection for critical facilities and repair personnel.⁸⁶ In one instance, however, a major communications provider successfully sought governmental security for its Poydras St. office in New Orleans, which serves as a regional hub for multiple telecommunications carriers. Both the Louisiana

⁷⁸ See Jacot-Cingular Jan. 30 Oral Testimony, Tr. at 123.

⁷⁹ See, e.g., Vincent-WLOX-TV Mar. 6 Oral Testimony, Tr. at 312 (describing how the radio station shared fuel with a nearby news organization).

⁸⁰ See, e.g., Oral Testimony of Steve Davis, Senior Vice President of Engineering, Clear Channel Radio, Before the FCC’s Independent Panel Reviewing the Impact of Hurricane Katrina, Tr. at 81-82 (Jan. 30, 2006) [hereinafter “Steve Davis-Clear Channel Jan. 30 Oral Testimony”].

⁸¹ See, e.g., Senate Report on Katrina at 18-4.

⁸² The Federal Response To Hurricane Katrina Lessons Learned, February 2006, at 40, available at <http://www.whitehouse.gov/reports/katrina-lessons-learned/>.

⁸³ Jan. 31 NSTAC Report at 5.

⁸⁴ See, e.g., Senate Report on Katrina at 18-4 (when government security proved unavailable, many telecommunications providers hired private security to protect their workers and supplies); Written Statement of Dave Flessas, Vice President for Network Operations, Sprint Nextel Corp., Before the FCC’s Independent Panel Reviewing the Impact of Hurricane Katrina, at 2 (Jan. 30, 2006) (security issues forced Sprint to hire armored guards to protect its employees and contractors); Jan. 31 NSTAC Report at 5.

⁸⁵ Pub. L. No. 93-288, as amended [hereinafter “Stafford Act”].

⁸⁶ See, e.g., Smith-BellSouth Jan. 30 Written Statement at 9; Jacot-Cingular Jan. 30 Oral Testimony, Tr. at 125; see also Oral Testimony of Captain Thomas Wetherald, Deputy Operations Director, National Communications System, Before the FCC’s Independent Panel Reviewing the Impact of Hurricane Katrina, Tr. at 24 (Apr. 18, 2006) [hereinafter “Capt. Wetherald Apr. 18 Oral Testimony”].

State Police and the FBI provided security so that BellSouth workers could return to the office and keep it in service.⁸⁷

Apparently, several companies that had their own security forces shared them with other communications providers by forming a convoy to go to a particular area.⁸⁸ Such arrangements seemed to occur on a purely informal basis. There did not appear to be any forum or staging area for fostering industry sharing of security forces or other resources.

4. *Pre-positioning of Equipment.* Limited pre-positioning of communications equipment may have slowed the recovery process. While some individual companies and organizations had some backup communications technologies on-hand for use after a disaster, most did not appear to locate strategic stockpiles of communications equipment that could be rapidly deployed and immediately used by persons in the impacted area.

B. Coordination Between Industry and Government.

1. *Industry – Federal Government Coordination.* Despite problems related above at the scene of the disaster, at the federal level, industry and government recovery coordination for the communications sector appeared to function as intended. Under the National Response Plan, the lead federal agency for emergency support functions regarding communications is the National Communications System (“NCS”). NCS manages the National Coordination Center for Telecommunications (“NCC”) in Washington, DC, which is a joint industry-federal government endeavor with 36 member companies.⁸⁹ The NCC meets on a regular basis during non-emergency situations; during and immediately after Katrina, it met daily and conducted analysis and situational monitoring of ongoing events and response capabilities.⁹⁰ The Katrina Panel heard that this group played an important and effective role in coordinating communications network recovery and allowing for information sharing among affected industry members.⁹¹ Yet, NCC membership is limited to only certain providers and does not represent a broad cross-section of the communications industry (for example, no broadcasters, WISPs, or cable providers are members).⁹² Accordingly, certain industry sectors or companies that might have been helpful were not a part of this coordination effort. State and local government are also not a part of this coordination effort.

⁸⁷ Smith-BellSouth Jan. 30 Written Statement at 8-9.

⁸⁸ See, e.g., Comments of Xspedius at 3.

⁸⁹ The NSTAC Report on the National Coordinating Center (4/27/06 Draft), The President’s National Security Telecommunications Advisory Committee, May 10, 2006, at 9-10 [hereinafter “May 10 NSTAC Report”].

⁹⁰ See Written Statement of Dr. Peter M. Fonash, Director, National Communications System, U.S. Department of Homeland Security, Ensuring Operability During Catastrophic Events, Before the Subcommittee on Emergency Preparedness, Committee on Homeland Security, United States House of Representatives, at 2, 6 (Oct. 26, 2005), available at <http://hsc.house.gov/files/TestimonyFonash.pdf>.

⁹¹ See, e.g., Capt. Wetherald Apr. 18 Oral Testimony, Tr. at 17 -18.

⁹² See May 10 NSTAC Report at 4.

The FCC was widely praised as playing a critical role in helping to restore communications connectivity in the wake of Hurricane Katrina.⁹³ During and immediately after Katrina, the Commission stayed open 24 hours a day, seven days a week to respond to the disaster.⁹⁴ Within hours of Katrina's landfall in the Gulf Coast region, the Commission established an internal Task Force to coordinate its response efforts,⁹⁵ focusing on providing regulatory relief where necessary, coordinating efforts with other federal agencies, and providing information and assistance to evacuees. To assist communications providers in their recovery, the Commission established emergency procedures to streamline various waiver and special temporary authority processes to speed needed relief,⁹⁶ reached out to various providers to determine their needs, and assisted communications providers in obtaining access to necessary resources.⁹⁷

These actions by the Commission appeared substantially to assist the industry in the recovery effort. The emergency, 24/7 contacts the Commission made available and the new streamlined processes clearly accelerated the time frame for receiving necessary regulatory approvals. However, the extensive communications outages made accessing this new information about who to contact and how to comply with the new processes difficult. Similarly, repair crews often did not know what repairs they needed to make until they reached the site.

In addition, while it was generally clear to communications providers that the Commission was the right agency to contact for regulatory relief after the disaster, the roles of other federal agencies in the recovery effort were not as clear to a large portion of the industry.⁹⁸ Communications providers who needed federal assistance (such as obtaining fuel authorizations or access to the impacted area), often did not know whom to contact. Industry participants also appeared generally unclear about which federal agency was responsible for implementing important recovery programs or distributing resources to communications companies operating in the impacted area. Competing requests for outage information from government entities at the federal, state and local level added to the confusion about agency roles. And responding to duplicative, repeated inquiries in the aftermath of Hurricane Katrina was cited by some as a distraction to communications providers' restoration efforts.

⁹³ See, e.g., The Federal Response to Hurricane Katrina: Lessons Learned at 142-43 (February 2006).

⁹⁴ See, e.g., Martin Sept. 29 Written Statement at 3.

⁹⁵ Moran Sept. 7 Written Statement at 4.

⁹⁶ See, e.g., International Bureau Announces Procedures to Provide Emergency Communications in Areas Impacted by Hurricane Katrina, FCC Public Notice (rel. Sept. 1, 2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-260835A1.pdf.

⁹⁷ See Steve Davis-Clear Channel Jan. 30 Oral Testimony, Tr. at 83 (describing how the Audio Division of the FCC's Media Bureau helped radio licensees secure access to fuel).

⁹⁸ See, e.g., Written Statement of C. Patrick Roberts, President of the Florida Association of Broadcasters, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, at 3 (Mar. 7, 2006) (observing that American must have a more cohesive and comprehensive program among federal, state, and local governments to prepare for disasters); *see also* Sprint-Nextel Jan. 30 Written Testimony at 4-5 (recognizing that there is a need to clarify the roles and responsibilities of the government agencies that are involved telecommunications restoration).

2. Industry – State and Local Government Coordination. In general, coordination between communications providers and state and local government officials in the affected region for communications network recovery purposes did not appear to exist except on an *ad hoc* basis. For the most part, there did not appear to be in existence any organized mechanism for communications providers to share information with local officials or to seek their assistance with respect to specific recovery issues, like access and fuel. Following Katrina, the Panel heard that state and local government representatives were exchanging business cards with communications providers in their area for the first time. Local government officials noted that they sometimes did not know where to turn to figure out why communications to and from key government locations did not work and how to express their priorities for communications service restoration. In addition, coordinating credentialing, access, fuel sharing, security and other key recovery efforts was difficult because there were no identified staging areas or coordination points for the communications industry.

3. Federal Government – State and Local Government Coordination. The Panel is not aware of pre-established mechanisms through which the federal government coordinated with state and local governments concerning communications network restoration issues in the wake of Katrina. For example, the Panel heard that civilian public safety officials were often unable to communicate with military officials brought in to assist local law enforcement. In addition, state and local governments are not a part of the NCC⁹⁹ and, therefore, were not able to directly coordinate with that industry-federal government group. As noted above, and due in part to a lack of pre-arranged recovery procedures, state and local government officials did not seem to be part of communications network recovery efforts. This meant that their restoration priorities may not have been effectively conveyed to communications providers and that communications providers did not have an identified place to turn for assistance with access and other recovery issues.

C. Emergency Communications Services and Programs.

The federal government, through the NCS, has established several programs for priority communications services during and following an emergency.¹⁰⁰ These are the Government Emergency Telecommunications Service (“GETS”), which enables an eligible user to get priority call completion for wireline telephone calls; the Wireless Priority Service (“WPS”), which enables an eligible user to get access to the next free channel when making a wireless call; and Telecommunications Service Priority (“TSP”), which enables a qualifying user to get priority restoration and provisioning of telecommunications services.¹⁰¹ During and after Katrina, these priority services seemed to work well for those who subscribed to them. However, only a small percentage of those eligible for the services appeared to do so. This is particularly true of public safety users – many eligible public safety entities have not signed up for these services. It also appears to be true for some communications providers, including

⁹⁹ See May 10 NSTAC Report at 3.

¹⁰⁰ See, e.g., Capt. Wetherald Apr. 18 Oral Testimony, Tr. at 18.

¹⁰¹ See, e.g., Written Statement of Dr. Peter Fonash, Deputy Manager, National Communications System, S. Comm. on Homeland Security and Gov’t Affairs, Hearing on Managing Law Enforcement and Communications in a Catastrophe at 3-4 (Feb. 6, 2006), available at <http://hsgac.senate.gov/files/020606Fonash.pdf>.

broadcast, WISP, and cable companies. These priority services could be an extremely useful tool in network restoration efforts. Yet, they are tools that appear not fully utilized. Like other emergency tools, they require training and practice. In some cases, users who had access to these services did not fully understand how to use them (*e.g.*, that a WPS call requires inputting a GETS code so the call would get priority treatment when it reached the landline network).

III. First Responder Communications

In the days following Hurricane Katrina, the ability of public safety and emergency first responders to communicate varied greatly across the affected region. The areas in and around New Orleans were seriously impacted.¹⁰² New Orleans EMS was forced to cease 911 operations in anticipation of Katrina's landfall and, after the levees were breached, a total loss of EMS and fire communications ensued.¹⁰³ The communications infrastructure in coastal areas was heavily damaged due to winds or flooding.¹⁰⁴ As a result, more than 2000 police, fire and EMS personnel were forced to communicate in single channel mode, radio-to-radio, utilizing only three mutual aid frequencies.¹⁰⁵ Some mutual-aid channels required each speaker to wait his or her turn before speaking, sometimes up to twenty minutes.¹⁰⁶ This level of destruction did not extend to inland areas affected by the hurricane so, in contrast to New Orleans, neither Baton Rouge nor Jackson County, Mississippi, completely lost their communications capabilities and were soon operating at pre-Katrina capabilities.¹⁰⁷ In the hardest hit areas, however, the disruption of public safety communications operability, as well as a lack of interoperability, frustrated the response effort and caused tremendous confusion among official personnel¹⁰⁸ and the general public.

State and local first responders are required to act and communicate within minutes after disasters have occurred and not hours or days later when Federal or other resources from outside the affected area become available. As further described below, the lack of effective emergency communications after the storm revealed inadequate planning, coordination and training on the use of technologies that can help to restore emergency communications. Hurricane Katrina also highlighted the long-standing problem of interoperability among public safety communications

¹⁰² See, *e.g.*, Saussy Mar. 6 Oral Testimony, Tr. at 43.

¹⁰³ *Id.*

¹⁰⁴ Jeff Smith Written Statement at 12.

¹⁰⁵ Presentation of Major Mike Sauter, Office of Technology and Communications, New Orleans Police Department, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, at 1 (Feb. 1, 2006) [hereinafter "Sauter Written Statement"].

¹⁰⁶ See, *e.g.*, Senate Report on Katrina at 21-6 (NOFD and NOPD were forced to use a mutual aid channel, rather than the 800 MHz trunk system they were supposed to operate on; transmission over the mutual aid channel was limited and could not reach certain parts of the city).

¹⁰⁷ See Oral Testimony of George W. Sholl, Director, Jackson County Emergency Communications District, Before the FCC's Independent Panel Reviewing the Impact of Hurricane Katrina, at Tr. at 58-59 (Mar. 6, 2006) [hereinafter "Scholl Mar. 6 Oral Testimony"].

¹⁰⁸ Saussy Mar. 6 Oral Testimony, Tr. at 43-44.